This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Original) A purification device for an exhaust gas of a diesel engine, comprising:

a catalyst which traps nitrogen oxides in the exhaust gas but decreases a nitrogen oxides trapping performance when poisoned by sulfur oxides in the exhaust gas, the sulfur oxides poisoning the catalyst being eliminated by contact with an exhaust gas corresponding to a rich air-fuel ratio;

a filter which traps particulate matter in the exhaust gas and burns a trapped particulate matter by contact with an exhaust gas corresponding to a lean air-fuel ratio;

an air-fuel ratio regulating mechanism which varies an exhaust gas composition of the engine between a composition corresponding to the lean air-fuel ratio and a composition corresponding to the rich air-fuel ratio;

a sensor which detects a particulate matter trap amount of the filter; and

a programmable controller programmed to:

control the air-fuel ratio regulating mechanism to cause the exhaust gas composition of the engine to be in a state corresponding to the rich air-fuel ratio;

determine whether or not the particulate matter trap amount has reached a predetermined amount while the exhaust gas composition is in a state corresponding to the rich air-fuel ratio;

control the mechanism to cause the exhaust gas composition to be in a state corresponding to the lean air-fuel ratio, when the particulate matter trap amount has reached the predetermined amount during a period when the exhaust gas composition is in a state corresponding to the rich air-fuel ratio;

determine whether or not the particulate matter trap amount has reached a predetermined decrease state during a period when the exhaust gas composition is in the state corresponding to the lean air-fuel ratio; and

control the mechanism to cause the exhaust gas composition to be in a state corresponding to the rich air-fuel ratio, when the particulate matter trap amount has reached the predetermined decrease state during the period when the exhaust gas composition is in the state corresponding to the lean air-fuel ratio.

2. (Original) The purification device as defined in Claim 1, wherein the sensor comprises a sensor which detects a differential pressure between an inlet and an outlet of the filter.

3. (Original) The purification device as defined in Claim 1, wherein the state of the exhaust gas composition corresponding to the rich air-fuel ratio, corresponds to an exhaust gas produced by combustion of an air-fuel mixture wherein an excess air factor is within the range 0.95 to 1.0.

4. (Original) The purification device as defined in Claim 1, wherein the state of the exhaust gas composition corresponding to the lean air-fuel ratio, corresponds to an exhaust gas produced by combustion of an air-fuel mixture wherein an excess air factor is within the range 1.05 to 1.1.

5. (Original) The purification device as defined in Claim 1, wherein the air-fuel ratio regulating mechanism comprises an intake throttle which regulates an intake air amount of the engine.

6. (Original) The purification device as defined in Claim 1, wherein the air-fuel ratio regulating mechanism comprises a fuel injector which injects fuel into the exhaust gas of the engine.

7. (Original) The purification device as defined in Claim 1, wherein the engine comprises an exhaust gas recirculation passage which recirculates part of the exhaust gas into an intake air according to an exhaust gas pressure of the engine, and the air-fuel ratio regulating mechanism comprises an exhaust throttle which regulates the exhaust gas pressure.

8. (Original) The purification device as defined in Claim 1, wherein the engine comprises a fuel injector which supplies fuel for combustion, and the air-fuel ratio regulating mechanism comprises the fuel injector set to perform a post-injection after fuel is supplied for combustion.

9. (Original) The purification device as defined in Claim 1, wherein the controller is further programmed to determine that, when the exhaust gas composition of the engine has continued to be in the state corresponding to the lean air-fuel ratio for a predetermined time, the particulate matter trap amount has reached the predetermined decrease state.

10. (Original) The purification device as defined in Claim 1, wherein the predetermined amount corresponds to a state where the particulate matter trap amount is saturated, and the predetermined decrease state corresponds to a state where the particulate matter trap amount is zero.

11. (Original) The purification device as defined in Claim 1, wherein the predetermined decrease state corresponds to a differential pressure when the controller started to control the air-fuel ratio regulating mechanism for the first time to cause the exhaust gas composition of the engine to be in the state corresponding to the rich air-fuel ratio.

12. (Original) A purification device for an exhaust gas of a diesel engine, comprising:

a catalyst which traps nitrogen oxides in the exhaust gas but decreases a nitrogen oxides trapping performance when poisoned by sulfur oxides in the exhaust gas, the sulfur oxides poisoning the catalyst being eliminated by contact with an exhaust gas corresponding to a rich air-fuel ratio;

a filter which traps particulate matter in the exhaust gas and burns a trapped particulate matter by contact with an exhaust gas corresponding to a lean air-fuel ratio;

an air-fuel ratio regulating mechanism which varies an exhaust gas composition of the engine between a composition corresponding to the lean air-fuel ratio and a composition corresponding to the rich air-fuel ratio;

means for detecting a particulate matter trap amount of the filter;

means for controlling the air-fuel ratio regulating mechanism to cause the exhaust gas composition of the engine to be in a state corresponding to the rich air-fuel ratio;

means for determining whether or not the particulate matter trap amount has reached a predetermined amount while the exhaust gas composition is in a state corresponding to the rich air-fuel ratio;

means for controlling the mechanism to cause the exhaust gas composition to be in a state corresponding to the lean air-fuel ratio, when the particulate matter trap amount has reached the predetermined amount during a period when the exhaust gas composition is in a state corresponding to the rich air-fuel ratio;

means for determining whether or not the particulate matter trap amount has reached a predetermined decrease state during a period when the exhaust gas composition is in the state corresponding to the lean air-fuel ratio; and

means for controlling the mechanism to cause the exhaust gas composition to be in a state corresponding to the rich air-fuel ratio, when the particulate matter trap amount has reached the predetermined decrease state during the period when the exhaust gas composition is in the state corresponding to the lean air-fuel ratio.

13. (Original) A method for controlling a purification device for an exhaust gas of a diesel engine, the device comprising a catalyst which traps nitrogen oxides in the exhaust gas but decreases a nitrogen oxides trapping performance when poisoned by sulfur oxides in the exhaust gas, wherein the sulfur oxides poisoning the catalyst is eliminated by contact with an exhaust gas corresponding to a rich air-fuel ratio, a filter which traps particulate matter in the exhaust gas and burns a trapped particulate matter by contact with an exhaust gas corresponding to a lean air-fuel ratio, and an air-fuel ratio regulating mechanism which varies an exhaust gas composition of the engine between a composition corresponding to the lean air-fuel ratio and a composition corresponding to the rich air-fuel ratio, the method comprising:

determining a particulate matter trap amount of the filter;

controlling the air-fuel ratio regulating mechanism to cause the exhaust gas composition of the engine to be in a state corresponding to the rich air-fuel ratio;

determining whether or not the particulate matter trap amount has reached a predetermined amount while the exhaust gas composition is in a state corresponding to the rich air-fuel ratio;

controlling the mechanism to cause the exhaust gas composition to be in a state corresponding to the lean air-fuel ratio, when the particulate matter trap amount has reached

the predetermined amount during a period when the exhaust gas composition is in a state corresponding to the rich air-fuel ratio;

determining whether or not the particulate matter trap amount has reached a predetermined decrease state during a period when the exhaust gas composition is in the state corresponding to the lean air-fuel ratio; and

controlling the mechanism to cause the exhaust gas composition to be in a state corresponding to the rich air-fuel ratio, when the particulate matter trap amount has reached the predetermined decrease state during the period when the exhaust gas composition is in the state corresponding to the lean air-fuel ratio.